Administrator's Column

(In this column, NASA Activities features excerpts of an article by NASA Administrator James Beggs. These articles focus on subjects chosen by him that address topics of broad interest to the agency's employees. The column this month features an address presented at the United States Space Foundation Second Annual Symposium, Colorado Springs, Colorado.)

Exploring And Working In Space

Our young people will determine America's future in space. They will be the scientists, the engineers and the taxpayers who will secure that future through their interest, involvement and support. It is vital then, that we continue to help them adapt to the Space Age and the technological revolution it has helped to spawn.

We must continue to motivate them to aspire to excellence to go as high as their ambition and courage will take them. And if we can persevere in feeding their insatiable hunger for knowledge, stimulating their imaginations and expanding their horizons, we will have given them, and our country, a priceless gift indeed.

Space has come into our lives to stay. It drives our scientific and technological progress. It is playing an increasingly important role in contributing to our economic, social, cultural and even physical well-being. And, because it is endless and holds great mysteries, it continues to challenge the human species to dare to explore and understand it.

How we meet that challenge through the end of the century and beyond will, in Shakespeare's words, "fill up chronicles in time to come," and indeed, I believe, could affect the course of civilization itself.

At NASA, we have always liked to look ahead. And because we do, some of our great dreams have become realities. So tonight, I would like to do that. I will take my cue from the authors Will and Ariel Durant. You may remember that after completing their many-volumed history of the world, they sat down and wrote one last book called "The Lessons of History."

In that book, they concluded, among other things, that human nature has not changed since the days of the Caesars; progress is always slow and Utopia is not in sight. But, in spite of all that, the Durants believed that the course of civilization has been gradually upward.

I agree with that, I also believe that since the dawn of the Space Age, we have been on a voyage of discovery that has moved civilization upward farther and faster than in any other period in history.

The distances in the solar system are very great, those in the Universe even greater. The times it takes for our spacecraft to cover them are very long. Yet, by the end of this decade, we will have taken a close look at all of the planets in our solar system, except Pluto, the farthest from our sun. And with the Hubble Space Telescope, we will, incredibly, have seen galaxies some 14 billion light years away, seen them as they were when the light we see left them 14 billion years ago.

Since our best estimate of the age of the Universe is some 14 to 15 billion years, we should be able to see back in time almost to its beginnings. We will, in effect be experiencing the present existence of the past.

The poet Browning wrote, "Ah, but a man's reach should exceed his grasp, or what's a heaven for."

Browning would be delighted at what we are doing in space. For we are, literally, reaching for the stars. In the coming years we will continue to reassess our place in the cosmos and increase our understanding of Earth, the solar system and the Universe. We have embarked on what I believe to be humanity's greatest scientific, intellectural and cultural adventure. Let us just look at what we will be doing in space over the next few years.

In January 1984, President Reagan called on NASA to establish a permanent, manned Space Station within a decade. He also invited our friends and allies in Europe, Canada and Japan to join with us in building, operating and using the station through the end of the century and beyond. We are very pleased that they have decided to work with us in the initial design and definition phase.

The Space Station, will be the key to all our future efforts in space. From there, we could go back to the Moon, build a base and begin to mine its resources.

Using the station as a staging base, we could also send people to explore Mars, next to Earth, the most hospitable of planets to humankind. We could begin visits to the asteroids, deep space probes, and other

endeavors we can hardly imagine today. The Space Station will open options as boundless as space itself.

But before those activities begin, we will be doing other things on the Space Station. Among the most important will be industrial research for extended periods of time, just like we do on Earth—research which will benefit all mankind. The microgravity of space will enable us to manufacture new medicines and vaccines, new alloys and perfect crystals, materials difficult or impossible to make on Earth.

The near-perfect vacuum that will exist in the wake of the station will be a boon to industry. Reproducing such a vacuum on Earth is very expensive, and the vacuum is short-lived. Once we are on the Space Station, we will get it free and for as long a period as necessary.

On the Space Station we will be able to use the magnificent vantage point of space to study Earth and the Universe for periods of long duration. We will get a continuous view of Earth, the solar system and the Universe, unobstructed by Earth's atmosphere. So, for the first time, we will be able to observe nature at work on Earth and in space, continuously, for decades at a time.

Most satellites are relatively short-lived. The Space Station will help to prolong their life, because from there, we can reach them and bring them in for service and repair. Our dramatic satellite repair and rescue missions this year and last are just a preview of the kinds of things we will be doing once the station is up and operating.

The station will have both manned and unmanned elements. We expect it to grow and evolve as our needs in space expand, and, with the full participation of our friends and allies, we expect that the station's capabilities will expand manyfold as we continue to explore commercial, scientific and industrial opportunities together.

But even before the Space Station opens for business, we and our international partners will be doing some very exciting and challenging things in space.

Next year, for example, will be one of the most important years ever in the history of space exploration.

In January, our Voyager 2 spacecraft, launched in 1977 to study the outer planets, will fly by Uranus. We will get our first close look at that seventh planet from the sun, which is almost invisible from Earth without the aid of a telescope. We expect to learn much about it and its five known moons and to see things we have never seen before.

Also in January, we will launch a spacecraft called Spartan from the Space Shuttle. Spartan will give us the first look at the tail of Halley's Comet in the ultraviolet portion of the spectrum. It will be a very useful complement to the international effort in March to study the comet intensively for the first time from spacecraft.

One of our contributions to that effort, and an important one, will be to observe and photograph the comet from the Space Shuttle with special instruments and a unique wide-field camera. In March, we will launch a shuttle payload called ASTRO, which will be brimful of scientific instruments to study Halley's Comet in the far ultraviolet part of the spectrum. The camera on ASTRO will photograph the comet in its entirety. We regret we will not be sending a probe to Halley's. But we expect ASTRO to provide a superb set of images and the most complete sampling of a comet's ion and dust tail ever made.

In May, we will launch two great probes, both the fruits of international efforts, one to the sun and one to Jupiter.

The first will be the Ulysses spacecraft which will study the sun's poles for the first time.

The Ulysses project was developed by the Europeans and has some American instruments on it. Now, you may think we're a bit daft to launch Ulysses towards Jupiter, when that planet is 391 million miles farther from the sun than we are. But that's what we will be doing, so as to take advantage of Jupiter's gravity and use it to sling-shot Ulysses over the sun's poles.

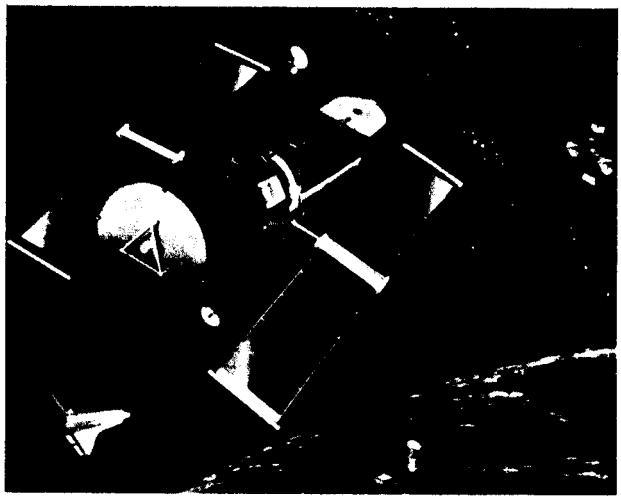
We'll be going directly to Jupiter, though, with Project Galileo, the second great probe, which is named after the great Italian astronomer who discovered the four largest Jovian moons 375 years ago. Galileo will make the first comprehensive survey of the Jovian system, the planet and its satellites. That system has been likened to a miniature version of our own solar system.

Galileo will send a probe vehicle to penetrate deep into the maelstrom of Jupiter's atmosphere. It also will put an orbiter around the planet for many months to traverse its complex magnetosphere, observe its changing cloud patterns and atmospheric structure and study its major satellites. So, for the first time, we will be able to sample the primordial gases from which we believe our own Earth evolved.

In August, we will launch the Hubble Space Telescope, which, as I have already explained, will open wide our window on the Universe.

The Space Telescope is probably the most important scientific instrument ever to be put in space. With it we will be able to see objects 7 times farther,

50 times fainter and with 10 times the clarity than we can now with telescopes on Earth. Let me give you an idea of how the Space Telescope will extend our vision. If you were to lie on your back in an average-sized room with a normal 8-foot ceiling and obscure your view with your hand about 8 inches from your eye, that would equate to what we can see now with Earth-based telescopes. Then put your hand down. Your new field would represent the Space Telescope's expected field of vision.



Artist concept of the Space Telescope showing the Shuttle, TDRSS, and a ground station.

The Space Telescope's scientific contributions may dwarf all but the most fundamental discoveries of the past, and lead to a quantum growth in our understanding of the basic nature of time, matter and energy and their interrelationships. In short, the Space Telescope may help us prove what Einstein never could: that there is a single all-embracing theory—a unified field theory—that ties all the physical laws together.

Then, in December, as Galileo proceeds towards Jupiter, it will fly by and view at close range a very large asteroid called Amphitrite. For the first time, we will get good measurements of a large object in the asteroid belt. We may learn its exact composition and perhaps increase our understanding of how the asteroid belt came into being.

So next year will be a splendid year for science in space and I hope you will all follow what we will be doing. But, as you do, remember that we will be just beginning. The Hubble Space Telescope will be only the first of our permanent facilities in space. By the mid-1990s, we expect to be launching larger arrays of instruments. We'll bring on an x-ray observatory, a more up-to-date infrared observatory and many, many others as the years roll by. All of them will live for a very long time and return many times our investment in new knowledge and in new technology which will benefit us right here on Earth.

I believe we are at a key turning point in our enterprise in space. We are entering an era where new tools like the Space Station, the Space Telescope and advanced technologies and concepts will extend both our vision and our reach.

Shakespeare wrote: "Nature must obey necessity."

Our nature is to want to know. That is our cultural imperative, and, indeed, our cultural inheritance.

Since the dawn of civilization, people have gazed at the heavens and speculated about our place in the Universe. Their thoughts are enmeshed in all religions and all cultures. We are, at long last, beginning to unravel the mystery of who we are and how we came to be. We are beginning to put together the pieces of the complex chain that connects the first instants of the Universe with its evolution and its destiny.

The happy consequence of that effort is that it benefits all of us on Earth.

So I would say again that the Durants were right on. The trend of civilization has been upward. So it will continue as long as we continue to wonder and as long as we continue to want to know.

And, if the past 27 years of exploring and working in space is any guide, I believe that will be for a very long time, indeed.

Student Project To Fly On Astro-Halley Mission

The National Aeronautics and Space Administration has announced that an educational experimental package has been added to the Astro-1 payload, scheduled for launch aboard the Space Shuttle Orbiter Columbia on March 6, 1986.

The "Can Do" student experiment, sponsored by the Charleston County, S.C. school district, will be included in the Astro-1 payload package that will perform a wide variety of astronomical observations. The Astro-1 complement of three ultraviolet astronomical instruments and a special visible-light, wide-field camera system will study Halley's Comet and other celestial objects during its 9-day flight in space.

The primary objective of the student project is to photograph Halley's Comet. Middle school students, grades 6 through 8, will study and interpret astronomical photographs obtained from the flight.